

## **DETAILED ACTION**

### ***Status of Application***

Claims 1-3 and 6-10 are pending. Claims 8-10 are withdrawn. Claims 1-3, 6 and 7 are presented for examination.

### ***Response to Arguments***

Applicant's arguments filed 4/5/2010 have been fully considered but they are not persuasive. First, the applicant argues that the combination of Ko and Leung fail to disclose a polyalkyleneoxide group being positioned between two silicon atoms. However, Ko teaches a thermally decomposable silane compound having a thermally decomposable organic group between two silicon atoms, and Leung teaches that polyalkyleneoxide groups are thermally decomposable groups. Therefore, the examiner maintains that the combination of the references teaches a polyalkyleneoxide between two silicon atoms. Furthermore, the examiner contends that one having ordinary skill in the art at the time of the invention could have made this compound and would have expected it to perform better than Ko's thermally decomposable organic silane.

Further, the applicant argues that there invention provides unexpected results. However, the examiner contends that these results would have been expected given Leung's teaching regarding the thermally decomposable polyalkyleneoxide providing extremely low dielectric constants.

Finally, the applicant argues that Ko in view of Lu fail to disclose the claimed thermally decomposable organic silane. However, Ko teaches a thermally decomposable silane compound having a thermally decomposable organic group between two silicon atoms, and Lu teaches that polyalkylenecoxide groups are thermally decomposable groups. Therefore, the examiner maintains that the combination of the references teaches a polyalkylenecoxide between two silicon atoms. Furthermore, the examiner contends that one having ordinary skill in the art at the time of the invention could have made this compound and would have expected it to perform better than Ko's thermally decomposable organic silane.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1-3, 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al. (U.S. PG PUB No. 2001/0055891) in view of Leung et al. (U.S. Pat. No. 6204202).

I. Regarding claims 1, 3 and 6, Ko teaches a organosilicate polymer and a method for preparing an organosilicate polymer by mixing a pore-forming component, which may be a thermally decomposable organic silane compound having formula I,  $R^3_p Y_{3-p} Si-M-SiR^4_q Z_{3-q}$ , (see Ko at claim 2 and 0049), and wherein the organic component M is a decomposable organic group (see Ko at example 3, 0049) and a silane compound or oligomer that can have the formula II as is claimed (see 0028,0049 and claim 2) and then adding water and a catalyst to conduct hydrolysis and condensation (0037 and 0049) to form covalent bonds between the two compounds. Ko teaches that the organic substance can be decomposed at 450 °C or less and may be an alkylene or arylene group (see Ko at claim 2 and 0049). Ko fails to teach that the decomposable organic group may be a polyalkyleneoxide. However, Leung teaches a method for forming nanoporous materials having low dielectric constants (abstract), in the range of 1.5 to about 3.8 (column 10, lines 21-25, note that overlapping ranges are *prima facie* evidence of obviousness) by removal of porogens, wherein the porogens are thermolabile and may be

copolymerized with the silicon-based polymer (column 8, lines 15-27 and column 6, line 38). Leung further teaches that preferred thermolabile groups include polyalkyleneoxides (column 9, lines 8-10) having a molecular weight from 200-7500 (column 9, lines 1-7, note that overlapping ranges are *prima facie* evidence of obviousness). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ko's polymer and method by utilizing a polyalkyleneoxide, such as polypropyleneoxide in place of Ko's alkylene or arylene groups, thereby providing access to dielectric films having a dielectric constant of less than about 2.21. One would have been motivated to make this modification to provide access to extremely low dielectric constant films (see Leung at abstract). Furthermore, one would have been motivated to make this modification, as one of ordinary skill in the art at the time of the invention could have made this particular substitution with a reasonable expectation of success (given that Leung is utilizing the polyalkyleneoxide for the same purpose that Ko is utilizing the alkylene or arylene groups, and Leung actually teaches copolymerizing the porogen with the silicon-based polymer, see above), and the predictable result of providing a polymer that can be heated to produce a porous film.

II. Regarding claim 2, Ko teach in view of Leung teach all the limitations of claim 1, but fail to teach the particular compounds as claimed. However, Ko does teach compounds of formula I (see above), where M is an organic group and  $R^3$  and  $R^4$  can be alkyl, while Y and Z can be an alkoxy, where p and q are integers from 0-2 (see Ko at 0049). Leung teaches utilizing polypropyleneoxide as a thermolabile group (column 9, lines 8-14). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ko in view

of Leung's method to utilize bis-methyldimethoxysilylpropyl polypropyleneoxide as the decomposable organic silane. One would have been motivated to make this modification as one of ordinary skill in the art could have substituted this particular compound for the generic compounds taught by the combination of Ko in view of Leung with a reasonable expectation of success. One would have had a reasonable expectation of success, because the compound has two alkoxy groups for cross-linking to form a network polymer and it has the thermolabile organic group that would decompose upon heating to form a porous film. Furthermore, the results of this substitution would be predictable, namely that it would provide a similar organosilicate polymer that can be heated to provide an insulating film.

III. Regarding claim 7, Ko in view of Leung teach all the limitations of the organosilicate polymer of claim 6 (see rejection above) and Ko further teaches a coating composition (see 0049-0050) comprising the organosilicate polymer (see above) and an organic solvent (0050).

2. Claims 1-3, 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al. (U.S. PG PUB No. 2001/0055891) in view of Lu et al. (U.S. PG PUB No. 2005/0173803).

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

I. Regarding claims 1, 3 and 6, Ko teaches a organosilicate polymer and a method for preparing an organosilicate polymer by mixing a pore-forming component, which may be a thermally decomposable organic silane compound having formula I,  $R^3_p Y_{3-p} Si-M-SiR^4_q Z_{3-q}$ , (see Ko at claim 2 and 0049), and wherein the organic component M is a decomposable organic group (see Ko at example 3, 0049) and a silane compound or oligomer that can have the formula II as is claimed (see 0028,0049 and claim 2) and then adding water and a catalyst to conduct hydrolysis and condensation (0037 and 0049) to form covalent bonds between the two compounds. Ko teaches that the organic substance can be decomposed at 450 °C or less and may be an alkylene or arylene group (see Ko at claim 2 and 0049). Ko fails to teach that the decomposable organic group may be a polyalkyleneoxide. However, Lu teaches a method for forming nanoporous materials having low dielectric constants (0021 and 0065), in the range of 1.3 to 3 (0021, note that overlapping ranges are *prima facie* evidence of obviousness) by mixing a thermally decomposable organic group, such as polyalkylene oxide (0059) with a silicon compound of formula 2 (0048-0049). Lu further teaches that preferred decomposable organic groups include polyalkyleneoxides (0059) having a molecular weight from 100-3000 (0058, note that overlapping ranges are *prima facie* evidence of obviousness). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ko's polymer and method by utilizing a polyalkyleneoxide, such as polypropyleneoxide in place of Ko's alkylene or arylene groups, thereby providing access to dielectric films having a dielectric constant of less than about 2.21. One would have been motivated to make this modification to provide access to extremely low dielectric constant films (see Lu at 0021). Furthermore, one would have been motivated to make this modification, as one of ordinary skill in the art at the

time of the invention could have made this particular substitution with a reasonable expectation of success (given that Lu is utilizing the polyakyleneoxide for the same purpose that Ko is utilizing the alkylene or arylene groups), and the predictable result of providing a polymer that can be heated to produce a porous film.

II. Regarding claim 2, Ko teach in view of Lu teach all the limitations of claim 1, but fail to teach the particular compounds as claimed. However, Ko does teach compounds of formula I (see above), where M is an organic group and  $R^3$  and  $R^4$  can be alkyl, while Y and Z can be an alkoxy, where p and q are integers from 0-2 (see Ko at 0049). Lu teaches utilizing polypropyleneoxide as a thermolabile group (0059). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ko in view of Lu's method to utilize bis-methyldimethoxysilylpropyl polypropyleneoxide as the decomposable organic silane. One would have been motivated to make this modification as one of ordinary skill in the art could have substituted this particular compound for the generic compounds taught by the combination of Ko in view of Lu with a reasonable expectation of success. One would have had a reasonable expectation of success, because the compound has two alkoxy groups for cross-linking to form a network polymer and it has the thermolabile organic group that would decompose upon heating to form a porous film. Furthermore, the results of this substitution would be predictable, namely that it would provide a similar organosilicate polymer that can be heated to provide an insulating film.

III. Regarding claim 7, Ko in view of Lu teach all the limitations of the organosilicate polymer of claim 6 (see rejection above) and Ko further teaches a coating composition (see 0049-0050) comprising the organosilicate polymer (see above) and an organic solvent (0050).

***Conclusion***

Claims 1-3 and 6-10 are pending.

Claims 8-10 are withdrawn.

Claims 1-3, 6 and 7 are rejected.

No claim is allowed.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT S. WALTERS JR whose telephone number is

(571)270-5351. The examiner can normally be reached on Monday-Thursday, 9:00am to 7:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571)272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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